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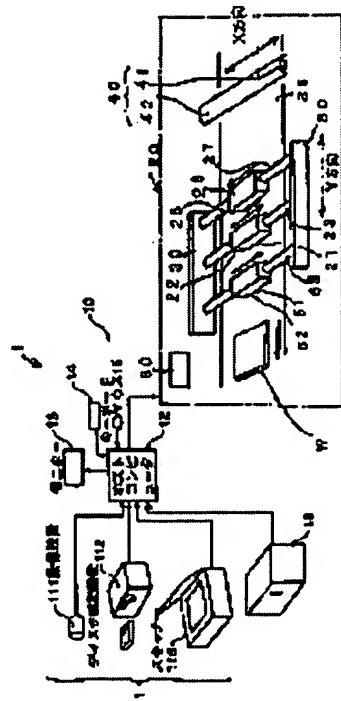
(54) MANUFACTURE OF COLOR-PRINTED ARTICLE AND COLOR PRINTER

(57) Abstract:

PROBLEM TO BE SOLVED: To provide a color-printed article and a color printer capable of performing printing of a precise pattern or a character even on a medium having a colored foundation and achieving printing superior in resistance to scratching even on a medium having no ink-absorbing property by a method of ink-jetting.

SOLUTION: By a color printer 1, a white foundation layer is formed on a printing face of a medium W by using a foundation layer forming head 51, then color printing is performed on the printing face by means of a recording head 21. When the face becomes in an incompletely drying condition, a liquid type coating agent is applied on the printing face of the medium W by using a coating head 25.

Ultraviolet rays are emitted to the liquid type coating agent from an ultraviolet emitting device 40 so that the coating agent is cured to be fixed, then the printing face of the medium W is coated with an overcoat film.



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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the manufacture approach of the color printed matter article from various media that the color of a substrate is different, and the color airline printer used for this manufacture approach.

[0002]

[Description of the Prior Art] As the color printing approach for a record form etc., color printing by the ink jet method is used abundantly. On the other hand, as an approach the color of the substrate of a plastic metallurgy group product etc. attaches a pattern in a color to the medium it is not necessarily white, since the color of a substrate is not necessarily white, it is restricted to the approach of the color paint which can apply ink to thick considerably so that the effect of the color of a substrate may not come out.

[0003]

[Problem(s) to be Solved by the Invention] However, although it is suitable for mass production method by the approach of color paint since it is necessary to raise a version each time also manufacturing various kinds of character items etc., it is inconvenient to manufacture the product of small quantity many forms. Moreover, for attaching a fine pattern and a fine alphabetic character by the approach of paint, it is unsuitable.

[0004] Moreover, since a plastic metallurgy group product etc. does not have ink absorptivity, when it prints by the ink jet method, ink's also peeling off having scratched lightly under the effect of the adhesion of ink and a substrate and scratch-proof nature are low.

[0005] Then, the technical problem of this invention is to offer the manufacture approach of the color printed matter article suitable for the color of a substrate attaching a fine pattern and a fine alphabetic character in a color also to the medium it is not necessarily white, and a color airline printer.

[0006] Furthermore, the technical problem of this invention is to offer the manufacture approach of a color printed matter article that high printing of scratch-proof nature can be performed, and a color airline printer, by the ink jet method also to a medium without ink absorptivity.

[0007]

[Means for Solving the Problem] In order to solve the above-mentioned technical problem, after forming a white substrate layer to the printed side of a medium, by the manufacture approach of the color printed matter article concerning this invention, it is characterized by breathing out the ink droplet of each color from the recording head of an ink jet method, and color-printing on said substrate layer.

[0008] In this invention, since it color-prints by the recording head of an ink jet method after forming a white substrate layer to the printed side of a medium, the color of a substrate can color-print a fine pattern and a fine alphabetic character in high grace also to the medium it is not necessarily white. Moreover, if it is the ink jet method, since it is not necessary to raise the version of the pattern which should be printed, it is suitable for performing printing and individual printing of small quantity many forms.

[0009] In this invention, when said printed side does not have ink absorptivity, after breathing out the ink droplet of each color from said recording head and color-printing on said substrate layer, it is desirable to cover the front face of the printed side concerned by the transparent overcoat film. That is, although ink may also peel off having scratched lightly, printing by the ink jet method to a medium without ink absorptivity since the adhesion of ink and a substrate is bad, in this gestalt, the front face of said printed side after printing was performed by the ink droplet is covered by the transparent overcoat film. Therefore, in the printed side after finishing printing and over coating, even if it scratches, ink does not come off.

[0010] In this invention, each performs it by solidifying this liquefied object, after formation of said substrate layer and said overcoat film applies a liquefied object to the front face of said printed side.

[0011] In this case, when each uses the thing of ultraviolet-rays hardenability as a liquefied object for forming said substrate layer and said overcoat film, this liquefied object can be put in block by UV irradiation, and can be stiffened.

[0012] Moreover, it can be made to harden collectively by heating the liquefied object concerned, when each uses a thermosetting thing as a liquefied object for forming said substrate layer and said overcoat film.

[0013] Furthermore, each liquefied object concerned may be stiffened with UV irradiation and heating using a thermosetting thing, respectively as a liquefied object for forming another side, using the thing of ultraviolet-rays hardenability as a liquefied object for forming either said substrate layer or said overcoat film depending on the affinity of said substrate layer and said overcoat film. In the color airline printer for enforcing such an approach The head for substrate stratification which breathes out white ink to the printed side of a medium, and forms a white substrate layer on the printed side concerned, By making relative displacement with the recording head of the ink jet method which color-prints by breathing out the ink droplet of each color on the substrate layer concerned, and said head for substrate stratification and said medium, and relative displacement with said recording head and said medium perform The migration device which enables formation of said substrate layer to said printed side and color printing of a up to [this substrate layer] is established.

[0014] Moreover, the head for substrate stratification which breathes out white ink to the printed side of a medium, and forms a white substrate layer on the printed side concerned, The recording head of the ink jet method which color-prints by breathing out the ink droplet of each color on the substrate layer concerned, The head for coatings which carries out the regurgitation of the liquefied coating agent for forming the transparent overcoat film to said printed side after color printing was performed by the ink droplet breathed out from this recording head, By making relative displacement with said head for substrate stratification and said medium, relative displacement with said recording head and said medium, and relative displacement with said head for coatings and medium perform It is desirable to use the color airline printer which has the migration device which makes possible formation of said substrate layer to said printed side, color printing of a up to [this substrate layer], and coating to this color printing side.

[0015] In this case, it is desirable to irradiate ultraviolet rays to said printed side by which said liquefied coating agent was breathed out, and to prepare the black light which bundles up said white ink and said liquefied coating agent on the printed side concerned, and is solidified, and the medium transport device which conveys said medium even to this black light.

[0016] Moreover, it is desirable to heat said printed side by which said liquefied coating agent was breathed out, and to prepare the heating apparatus which bundles up said white ink and said liquefied coating agent on the printed side concerned, and is solidified, and the medium transport device which conveys said medium even to this heating apparatus.

[0017] Furthermore, it is desirable to have the black light which irradiates ultraviolet rays to said printed side by which said liquefied coating agent was breathed out, and solidifies one of said white ink on the printed side concerned and said liquefied coating agents, the heating apparatus which heats said printed side and solidifies another side, and the medium transport device which conveys said medium even to this heating apparatus and said black light.

[0018]

[Embodiment of the Invention] With reference to a drawing, the manufacture approach of the color printed matter article which applied this invention is explained.

[0019] Drawing 1 is the outline block diagram of the color airline printer of this gestalt.

[0020] In drawing 1 , the color airline printer 1 consists of a data input system 10 which performs the input of the contents of printing over the medium W used as the candidate for printing etc. in general, and a color airline printer body 20 which performs full color printing to Medium W. Here, the printed side (top face) of Medium W consists of the quality of the materials without the ink absorptivity of a plastic metallurgy group product etc. Moreover, the printed side of Medium W consists of the quality of the materials with unspecified tone called wooden goods etc.

[0021] Image pick-up equipment 111, the disk driving gear 112, and the scanner 113 are constituted as an input device 11 for carrying out the data input of the color design for which a user wishes to the data input system 10. From these input devices 11, color design image data is outputted to a host computer 12.

[0022] As for a host computer 12, the user who displayed the image screen based on the color design image data inputted from the input device 11 on the monitor 13, and saw this image screen directs edit of expanding, reducing and patching an image screen through a keyboard 14 or a mouse 15. Moreover, a host computer 12 performs gradation processing, contrast processing, and amendment processing of the image which met the irregularity of the printed side of Goods W in order to perform color correction etc. further and to raise a quality of printed character to the edited color design image data if needed, and outputs output image data to the control means 60 of the color airline printer body 20 after an appropriate time.

[0023] the color airline printer body 20 -- the recording head 21 first for color printing -- carriage 22 -- minding -- the guide shaft 23 top -- the direction of an axis (a main scanning direction / X shaft orientations) -- a round trip -- it is in a movable condition. As for the recording head 21, the discharge direction of ink is set up downward.

[0024] Drawing 2 is the sectional view showing the configuration of a recording head 21.

[0025] As shown in drawing 2 , in the recording head 21, a nozzle orifice 111 is formed in a nozzle plate 110, and the

through-hole which divides the through-hole which divides the pressure generating room 113, the through-hole which divides two ink feed hoppers 114 which are open for free passage on both sides in the pressure generating room 113 or a slot, and two common ink rooms 115 which are open for free passage to these ink feed hoppers 114, respectively is formed at the passage formation plate 112. a diaphragm 116 consists of sheet metal in which elastic deformation is possible -- having -- the tip of the piezoelectric transducers PZT (pressure generating component), such as a piezoelectric element, -- contacting -- the passage formation plate 112 -- inserting -- a nozzle plate 110 and liquid -- it is densely fixed to one and the passage unit 118 is constituted.

[0026] The hold room 120 in which a piezoelectric transducer PZT is held possible [vibration], and the opening 121 which supports the passage unit 118 are constituted by the pedestal 119, and where the tip of a piezoelectric transducer PZT is exposed from opening 121, the piezoelectric transducer PZT is fixed to it with the fixed substrate 122.

Moreover, a pedestal 119 is in the condition of having made island section 116a of a diaphragm 116 contacting a piezoelectric transducer PZT, fixes the passage unit 118 to opening 121, and is summarizing the recording head 16.

[0027] If a piezoelectric transducer PZT contracts and the pressure generating room 113 expands by such configuration, the ink of the common ink room 115 will flow into the pressure generating room 113 via the ink feed hopper 114. If a piezoelectric transducer PZT develops and the pressure generating room 113 contracts after progress of predetermined time, the ink of the pressure generating room 113 will be compressed and an ink droplet will carry out the regurgitation from a nozzle orifice 111. The same of the regurgitation of such an ink droplet is said of the nozzle orifice 111 for carrying out the regurgitation of the ink of which color.

[0028] the head 25 for coatings which carries out the regurgitation of the liquefied coating agent in the downstream of a recording head 21 by the color airline printer body 20 in drawing 1 again -- carriage 26 -- minding -- the guide shaft 27 top -- the direction of an axis (a main scanning direction / X shaft orientations) -- a round trip -- it is in a movable condition. The discharge direction of a coating agent is set up downward also for the head 25 for coatings. Here, ultraviolet-rays hardenability resin, such as acrylic which can form the transparent over coating film as a liquefied coating agent, or an urethane system, etc. is used.

[0029] The head 25 for coatings is for carrying out the regurgitation of the liquefied coating agent for forming the transparent overcoat film to the front face of the printed side of the medium W after color printing was performed by the ink droplet breathed out from the recording head 21, as mentioned later. Although the spray head which sprays a liquefied coating agent in the shape of a fog can be used as this head 25 for coatings, a recording head 21 and the head of the same structure (refer to drawing 2) may be used. In this case, in the recording head 21 shown in drawing 2 , since what is necessary is to replace with the ink of each color, to supply a liquefied coating agent, and just to make it breathe out, that detailed explanation is omitted.

[0030] moreover, the head 51 for substrate stratification which carries out the regurgitation of the white ink in the upstream of a recording head 21 by the color airline printer body 20 -- carriage 52 -- minding -- the guide shaft 53 top -- the direction of an axis (a main scanning direction / X shaft orientations) -- a round trip -- it is in a movable condition. The discharge direction of ink is set up downward also for the head 51 for substrate stratification. Here, as white ink, ultraviolet-rays hardenability resin, such as acrylic or an urethane system, etc. is used.

[0031] The head 51 for substrate stratification is for carrying out the regurgitation of the white ink for forming a white substrate layer beforehand to the front face of the printed side of the medium W before color printing is performed by the ink droplet breathed out from the recording head 21, as mentioned later. Although the spray head which sprays white ink in the shape of a fog can be used as this head 51 for substrate stratification, a recording head 21 and the head of the same structure (refer to drawing 2) may be used. In this case, in the recording head 21 shown in drawing 2 , since what is necessary is to replace with ink, to supply white ink and just to make it breathe out, that detailed explanation is omitted.

[0032] The both ends of the guide shafts 23, 27, and 53 with which carriage 22, 26, and 52 is supported are supported by the frame 30 here, and migration to Y shaft orientations (the direction of vertical scanning) is possible for this frame 30. Thus, while a frame 30 performs migration to Y shaft orientations, when each carriage 22, 26, and 52 moves in the direction of X on the guide shafts 23 and 27 and 53, the migration device in which relative displacement with a recording head 21, relative displacement with Medium W and the head 25 for coatings, and Medium W and relative displacement with the head 51 for substrate stratification and Medium W are made to perform is constituted.

[0033] The medium transport device 35 which turns and conveys Medium W to Y shaft orientations is constituted by the lower part location of a recording head 21, the head 25 for coatings, and the head 51 for substrate stratification. The electrode holder (not shown) which receives the medium W which it lets out from the goods reservoir section (not shown) consists of this medium transport device 35, and this electrode holder holds Medium W, where that printed side is turned upwards.

[0034] Furthermore, the black light 40 is arranged at the downstream in the conveyance direction of the medium transport device 35. The ultraviolet ray lamp 41, the reflector 42 which reflects the light emitted from this ultraviolet ray lamp 41 towards the medium W conveyed by the medium transport device 35 to that lower part location, and the

protective cover (not shown) are constituted by this black light 40.

[0035] Although it can be used as a color airline printer 1 that such a color airline printer 1 of a configuration remains as it is, for home use, or business-use, when it constitutes so that many and unspecified persons may use the color airline printer 1 in a store or a street like an automatic vending machine or a game machine, to the color airline printer 1, the money distinction machine 18 which distinguishes the coin which the user threw in, and a bill is carried. The distinction result of this money distinction machine 18 is inputted into a host computer 12, and when a host computer 12 has an injection of predetermined money in the money distinction machine 18, it makes printing to Medium W perform [host computer] in the color airline printer body 20.

[0036] Such actuation is realized in a host computer 12 by CPU which operates based on the program of operation beforehand stored in ROM etc.

[0037] (Control system of a color airline printer body) With reference to drawing 3, the configuration of the control system constituted by the color airline printer body 20 is explained. In drawing 3, the control means 60 constituted by the color airline printer body 20 controls the carriage drive circuit 33 etc., and performs printing actuation while it first controls the recording head drive circuit 30 equipped with the driver voltage generating circuit 31 and the head selection circuitry 32 in response to the printing command signal and print data from a host computer 12, in order to perform predetermined printing to Medium W. That is, in the head drive circuit 30, the driver voltage generating circuit 31 is constituted so that the trapezoidal wave of an electrical-potential-difference value required for making an ink droplet breathe out from a nozzle orifice 111 may be generated. Moreover, the head selection circuitry 32 impresses alternatively the driver voltage of the driver voltage generating circuit 31 to the piezoelectric transducer PZT corresponding to print data by controlling Transistor T.

[0038] Moreover, when the thing of the same structure as the recording head 21 explained with reference to drawing 2 as a head 25 for coatings shown in drawing 1 is used, a control means 60 also controls head drive circuit 30' equipped with driver voltage generating circuit 31' for coatings, and head selection-circuitry 32' for coatings. In the head drive circuit 30 for these coatings, driver voltage generating circuit 31' is constituted so that the trapezoidal wave of an electrical-potential-difference value required for making a coating agent breathe out from the nozzle orifice of the head 25 for coatings may be generated. Moreover, head selection-circuitry 32' impresses driver voltage to piezoelectric transducer PZT' corresponding to the specified coating field alternatively by controlling transistor T'. Thus, when constituted, unlike the case where a spray nozzle is used, there is an advantage that the spreading field of a coating agent can be set as the range of desired, as well as the ability to apply a coating agent to the whole printed side of Medium W by solid one.

[0039] furthermore -- drawing 1 -- having been shown -- a substrate -- the stratification -- ** -- a head -- 51 -- ***** - - drawing 2 -- referring to -- having explained -- a recording head -- 21 -- being the same -- structure -- a thing -- having used -- a case -- *** -- a control means -- 60 -- a substrate -- the stratification -- ** -- driver voltage -- generating -- a circuit -- 31 -- " -- and -- a head -- a selection circuitry -- 32 -- " -- having -- a substrate -- the stratification -- ** -- a head -- a drive -- a circuit -- 30 -- " -- controlling . In 30" of head drive circuits for these substrate stratification, 31" of driver voltage generating circuits is constituted so that the trapezoidal wave of an electrical-potential-difference value required for making white ink breathe out from the nozzle orifice of the head 51 for substrate stratification may be generated. Moreover, 32" of head selection circuitries impresses driver voltage to piezoelectric transducer PZT" corresponding to the specified substrate stratification field alternatively by controlling transistor T". Thus, when constituted, unlike the case where a spray nozzle is used, there is an advantage that the spreading field of white ink can be set as the range of desired, as well as the ability to apply white ink to the whole printed side of Medium W by solid one.

[0040] Moreover, in the medium transport device 35 which referred to drawing 1, a control means 60 controls the motor M1 which drives the medium transport device 35 through the medium transport-device drive circuit 35 by this gestalt, and controls conveyance to Y shaft orientations of Medium W by it. Moreover, a control means 60 controls the motor M2 which drives a frame 30 to Y shaft orientations through the Y-axis drive circuit 36, and controls the physical relationship in Y shaft orientations of Medium W and carriage 22, 26, and 52 (a recording head 21, the head 25 for coatings, and head 51 for substrate stratification). Furthermore, a control means 60 controls the guide shafts 23 and 27 and the motor M3 which drives the carriage 22, 26, and 52 on 53 through the X-axis drive circuit 37, and controls the physical relationship in X shaft orientations of Medium W and carriage 22, 26, and 52 (a recording head 21, the head 25 for coatings, and head 51 for substrate stratification). therefore, with this gestalt, migration of the guide shafts 23 and 27 and the carriage 22, 26, and 52 on 53 is performed to coincidence -- having -- the separate medium W -- receiving -- coming out -- although it is, the regurgitation of white ink, the regurgitation of the ink droplet of each color, and the regurgitation of a coating agent will be performed to coincidence. In addition, of course, the guide shafts 23 and 27 and the carriage 22, 26, and 52 on 53 may be driven to according to, respectively. It realizes by CPU which operates based on the program of operation by which such actuation is also beforehand stored in ROM etc. in the color airline printer body 20.

[0041] (The manufacture approach of the printing approach / color printed matter article) Actuation of such a color airline printer 1 is explained with reference to drawing 4 and drawing 5. In addition, the color airline printer 1 explained here is the example constituted so that it might be installed in a shop front etc. and might print by a user throwing in a coin and a bill.

[0042] Drawing 4 is a flow chart which shows actuation of the color airline printer 1, and drawing 5 is the sectional view showing the process which prints to the printed side of Medium W.

[0043] In drawing 4, if the money distinction machine 18 distinguishes that the user threw in the coin of the predetermined amount of money from a standby condition (step ST 1) (step ST 2), the color airline printer 1 will stand by until image data is inputted. Here, if a user determines his face as a color design (step ST 3), the color design image data corresponding to it will be outputted from image pick-up equipment 111 to an image processing system 12, and edit processing will be performed (step ST 4). [who copied with image pick-up equipment 111] moreover, the shape of toothing of the printing side of Goods W is a slant face and the spherical surface -- etc. -- when it has the shape of fixed toothing, amendment processing of an image may be performed along with it (step ST 5)

[0044] In the case of this edit, since the image screen based on color design image data is displayed on a monitor 13, the user who saw this image screen directs edit of expanding, reducing and patching an image screen through a keyboard 14 or a mouse 15. And after finishing edit, a user performs a key stroke and directs whether to print as it is or stop (step ST 6). Here, when the key stroke of the purport which a user stops is performed, a coin is returned (step ST 7) and it returns to a standby condition (step ST 1).

[0045] On the other hand, when a user performs the key stroke of printing activation, a medium lets out from the goods reservoir section and the medium transport device 35 receives it (step ST 8).

[0046] Next, the medium transport device 35 conveys the received medium W this time in a just under [carriage 52 (head 51 for substrate stratification)] location (step ST 9).

[0047] a host computer 12 seems to form a white substrate layer in the field which color-prints later at least in this condition -- ** -- a command is outputted to the color airline printer body 20, and while carriage 52 moves in the guide shaft 53 top, the head 51 for substrate stratification of the color airline printer body 20 forms the white substrate layer C0 in the printed side W1 of Medium W, as shown in drawing 5 (A). Termination of formation of the substrate layer C0 for such a single tier forms the white substrate layer C0 in the predetermined field of the printed side W1 of Medium W by a frame's 30 moving by one step and repeating the above-mentioned substrate stratification actuation anew (step ST 10).

[0048] Next, the medium transport device 35 conveys the medium W which finished forming the substrate layer C0 in a just under [carriage 22 (recording head 21)] location (step ST 11).

[0049] In this condition a host computer 12 As opposed to the color design image data after edit Gradation processing, contrast processing. The output image data after performing color correction etc. furthermore is outputted to the color airline printer body 20. The recording head 21 of the color airline printer body 20 While carriage 22 moves in the guide shaft 23 top, as shown in drawing 5 (A), color printing C1 is performed for the contents as the user directed on the substrate layer C0 of the printed side W1 of Medium W. Termination of printing for such a single tier performs color printing to the printed side W1 whole of Medium W by a frame's 30 moving by one step and repeating the above-mentioned printing actuation anew (step ST 12).

[0050] Thus, after color printing is completed, the medium transport device 35 conveys Medium W in a just under [carriage 26 (head 25 for coatings)] location (step ST 13). When processing succeeding Medium W at this time, while the new medium W is conveyed in a just under [carriage 52 (head 51 for substrate stratification)] location, the new medium W which finished forming the substrate layer C0 is conveyed in a just under [carriage 22 (recording head 21)] location.

[0051] Next, at least, a host computer 12 orders the color airline printer body 20 a printing field so that a coating agent may be applied to the wrap range. Consequently, in the color airline printer body 20, while carriage 26 moves in the guide shaft 27 top, the head 25 for coatings applies to the printed side W1 of Medium W the liquefied coating agent C2 which has ultraviolet-rays hardenability, as shown in drawing 5 (B). Termination of coating for such a single tier applies a liquefied coating agent to the printed side W1 whole of Medium W by a frame's 30 moving by one step and repeating the above-mentioned actuation anew (step ST 14).

[0052] Next, after doing in this way and completing spreading of a liquefied coating agent, the medium transport device 35 conveys Medium W in a just under [a black light 40] location (step ST 15).

[0053] Next, as shown in drawing 5 (C), a black light 40 irradiates ultraviolet rays at the printed side W1 of Medium W, solidifies and fixes a coating agent. The ink of the white applied as a substrate layer C0 is solidified and fixed to coincidence. Consequently, the printed side W1 of Medium W is covered by the overcoat film C3 (step ST 16).

[0054] After an appropriate time, after an appropriate time, the medium transport device 35 discharges Medium W (step ST 17), and the color airline printer 1 returns to a standby condition (step ST 1).

[0055] Thus, with this gestalt, even if it is the printed side of the medium W which a color is not specified and does not

have ink absorptivity, it color-prints by breathing out an ink droplet from the recording head 21 of an ink jet method. Therefore; since it is not necessary to raise the version of the pattern which should be printed, it is suitable for performing printing and individual printing of small quantity many forms. However, printing by the ink jet method also to the medium W without ink absorptivity, since the adhesion of ink and a substrate is bad, ink may also peel off having scratched lightly. However, in this gestalt, the printed side of the medium W after printing was performed by the ink droplet is covered by the transparent overcoat film. Therefore, in the printed side after finishing color printing and over coating, even if it scratches, ink does not come off. Moreover, since it is covered by the transparent overcoat film even if ink is water solubility, it excels in the water resisting property etc.

[0056] Moreover, since the substrate layer C0 is formed in white ink before color-printing, even if the printed side W1 of Medium W is what color, high color printing of grace can be performed.

[0057] Although the above-mentioned gestalt which is [a gestalt of other operations] explained the example which prints to a thing flat as a medium W, since the head and the printed side are separated, printing to the irregular medium W is also possible somewhat.

[0058] Moreover, although the user explained what prints by throwing in a coin and a bill as a color airline printer 1, if the money distinction machine 18 etc. is excluded and it uses as business use, the demand of the customer that him wants the goods which gave the original ornament which is not can be met at short time for delivery.

[0059] Furthermore, what is necessary is to have installed the black light 40 in the color airline printer shown in drawing 1, since the white ink and the coating agent of ultraviolet-rays hardenability were used with the above-mentioned operation gestalt, but to replace with a black light 40 and just to use the heating apparatus which supplies hot blast or infrared radiation for the color airline printer shown in drawing 1, when thermosetting white ink and a thermosetting coating agent are used.

[0060] Adhesion may be raised further again using a thermosetting thing as a liquefied object for forming another side, using the thing of ultraviolet-rays hardenability as a liquefied object for forming either a substrate layer or the overcoat film depending on the affinity of a substrate layer and the overcoat film. In this case, each liquefied object is made hardened with UV irradiation and heating, respectively. for this reason, in the color airline printer for manufacturing such a color printed matter article The black light 40 which irradiates ultraviolet rays in drawing 1 to the printed side by which the liquefied coating agent was breathed out, and solidifies one of the white ink on the printed side concerned, and the liquefied coating agents, and heating apparatus which heats a printed side and solidifies another side (it does not illustrate.) The medium transport device 35 which conveys a medium even to this heating apparatus and black light 40 will be formed.

[0061]

[Effect of the Invention] As explained above, since it prints by breathing out an ink droplet from the recording head of an ink jet method after forming a white substrate layer to the printed side of a medium, by this invention, the color of a substrate can give monochrome printing or color printing for a fine pattern and a fine alphabetic character in high grace also to the medium it is not necessarily white. Moreover, if it is the ink jet method, since it is not necessary to raise the version of the pattern which should be printed, it is suitable for performing printing and individual printing of small quantity many forms.

[0062] Moreover, printing by the ink jet method also to a medium without ink absorptivity, since the adhesion of ink and a substrate is bad, having only scratched lightly or ink may come off, but by covering the front face of the printed side after printing was performed by the ink droplet by the transparent overcoat film, even when it scratches in the printed side after finishing printing and over coating, it can prevent that ink comes off.

[Translation done.]